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Author: Michael Krumm - RayScan Technologies GmbH

Co-Authors: Michael Krumm (RayScan Technologies GmbH) | Volker Hämmerle (RayScan Technologies GmbH) | Héctor Cárdenes (RayScan Technologies GmbH) | Michael Fix (RayScan Technologies GmbH) | Christoph Sauerwein (RayScan Technologies GmbH)

TITLE : 3D X-RAY INSPECTION SYSTEM FOR HELICOPTER ROTOR BLADES

ABSTRACTS

Modern-style helicopter rotor blades have a complex structure consisting of lightweight materials, such as fiber-reinforced plastics, foams or honeycomb structures, and metallic components such as titanium, aluminum or steel. Selection, combination and arrangement of the individual materials and structural elements are optimized to ensure the desired behavior for the respective rotor blade areas.

The quality assurance of such complex components requires a complete representation of the total component volume in order to detect pores, defects, delaminations, cracks and other discontinuities and to verify the inner structure. A detailed analysis showed that 3D X-ray techniques are best suited for this purpose.

The system presented here, was developed for the following purpose: complete horizontal, fully automatic handling and complete three-dimensional testing of helicopter rotor blades with up to 11 m length and 600 mm width and with up to 400 kg mass. Further, generation of 3D volume sectional images from partially incomplete data sets in different quality levels as well as processing and management of terabytes of memory. As part of the development, a novel measurement strategy for acquiring 3D information based on the successful RoboTom technique has been introduced, combined with an exact manipulation system and a compact radiation protection cabin.

This paper presents the developed system and the typical measurement results.

KEYWORDS

X-ray | 3D Computed Tomography | Helicopter | NDT | Rotor blades |